

# ARCHITECTURAL GUIDELINES FOR INJURY PREVENTION FOR OLDER HOOSIERS

## 1. PURPOSE STATEMENT

This brief is offered to all architects, engineers, residential designers, builders, developers, and agencies who are engaged in planning, building, developing or sponsoring housing intended to be occupied by the elderly citizens of Indiana. These housing units may be individual homes, apartments, retirement communities or other age-focused projects. The state of Indiana's Commission on Aging is seeking to improve the quality of life, to reduce health problems and to reduce the incidence of injuries among those persons age 50 and over. Most injuries to older citizens occur in their own home or apartment. We seek to assist designers and builders of these living units to become aware of features that will reduce the injury potential of the home. The end result will hopefully be safer homes, which in turn will result in more years of independent living for older Hoosiers.

## 2. THE ELDERLY AND INJURIES

### 2A. OCCURRENCE OF INJURIES

The glaring statistic that highlights the need for safer residential environments for the elderly is that about 2/3rds of all accidental falls which result in injuries that occur among only 11% of the population. This is the group 65 years old and above. Further, most of these falls occur at home. Falls are the most common cause of fatal injuries of older people. Frequent causes of falls are impaired vision and other diminished senses, fainting, imbalance, lack of dexterity and certain medical conditions. The contributing external factors to the falls are steps, loose rugs, slippery floors, tubs and showers, poor lighting, curbs, unreachable shelves, or other aspects of the built environment.

After falls, the most common accidental injury to the elderly is burns. The contributing elements here may be hot pots and pans, clothing contacting stove burners, residential fire, excessively hot water from water heaters, irons, space heaters, chemicals, or smoking in bed.

Improvements in the design of the home can reduce the incidence of some of these injuries and/or reduce the severity of others. A number of suggestions to accomplish this aim follow. There are very few suggestions in these guidelines that add cost to the price of or rent of the living unit. Those that do add modest cost are worth it in terms of benefit to the occupant.

### 2B. PHYSIOLOGY OF AGING

Aging is a general term, which describes the processes through which an individual eventually may manifest the socially defined characteristics of old age.

Sensory processes may deteriorate. Vision may become cloudy; colors fade; and the eye has greater difficulty focusing. The pupil is slow to adapt to bright light or glare. Hearing loss may become significant, especially in response to high frequencies. The elderly have a greater difficulty maintaining balance; hence falls are more frequent. The senses of taste and smell diminish. All general body sensations - touch, pain, muscle movement, and vibration - decrease.

Functional losses that result from aging include slower reaction time, slower processing of data by the brain, reduced muscle strength, and some memory loss. The presence of these characteristics varies among individuals and is, indeed, absent in some. However, these functional losses do characterize the elderly population as a whole and should be acknowledged and addressed in the design process.

## 3. CODE REQUIREMENTS AND "GUIDELINES"

These Injury Prevention Guidelines are not state regulations, nor are they mandatory. Rather they are suggestions for improving a marketable product: housing for the elderly. Also listed herein are some standards, which are taken from state building codes because these items are directly relevant to the subject here. These standards are noted as such when they occur. Design for the handicapped elderly is also not covered here; this subject is well covered in the *Indiana Handicapped Accessibility Code* and the *Americans with Disabilities Act Guidelines (ADAG)*.

#### **4. DESIGN SUBJECTS**

##### **4A. STAIRS AND STEPS**

Stairs and steps, both indoors and out, are formidable obstacles to many elderly and are the location of many seriously debilitating accidents. Stairs and steps should be avoided in environments designed for the elderly or minimized as much as possible. Successful negotiation of stairs requires strength, balance, dexterity, and good vision. . . characteristics that often diminish with aging.

1. **STAIR DIMENSIONS** - The rise of the steps should not exceed 7" and the run generally should not be less than 11", even though the *Indiana One and Two Family Dwelling Code* allows steeper slopes. Risers must be uniform in height.
2. **NUMBER OF STEPS** - A single step can easily be unnoticed and cause a fall. At least 3 steps are needed to be obvious.
3. **HANDRAILS** - Handrails should be placed on both sides of the stairs, even within the dwelling unit. The rail should extend beyond the steps at the top and the bottom.
4. **LIGHTING** - The stairs should be well illuminated by natural or artificial light. A light switch should be located at each end of the stairs. The fixture should not cause glare, nor should it cause any shadows. Window placement should not cause glare.
5. **CURBS** - Ramps are preferable to curbs outside. Either should be well lighted at night.
6. **ENTRANCES** - Do not place a step at a front or rear entrance. Provide a landing which is level with the house floor in front of the door.
7. **SURFACES** - Smooth stairs should be avoided. Use textured surface or abrasive strips. If carpeting is used, it should have a low nap. The top nosing may have a different texture or color to alert someone approaching from the upper level.
8. **PATTERNS** - Avoid patterned materials on steps that may tend to obscure the nosing edge of the step.

##### **4B. FLOORS**

The floor surface contributes to many trips and falls. Good housekeeping is a major factor, which is beyond the control of the designer, but there are design aspects, which will improve safety.

1. **SURFACE** - Smooth floor surfaces should be minimized. A low or moderate pile carpet is preferred in living rooms, bedrooms, hallways and stairs. Due to housekeeping needs, carpet is not now in favor in the kitchen or bath. In potentially wet areas such as kitchens, baths, entries or laundries, a hard surfaced flooring with some texture should be used; unglazed tile, rubber patterned tile, or textured vinyl are examples, with a minimum coefficient of friction of 0.60 wet and 0.70 dry.
2. **RUGS** - Where rugs or runners are installed, they should have a slip-resistant backing, carpet tape or a rubber matting.
3. **LEVELS** - Changes in floor levels must be avoided. Where they do occur, gently tapered transition strips should be used. Threshold heights at entry doors should be kept low, 1/2" at most.

#### 4C. **KITCHENS**

The kitchen is a very dangerous room for some elderly, while at the same time essential for their continued independence. The designer should seek to modify standard elements that may cause older persons to overextend their capabilities.

1. **CABINETS** - Cabinets should be lowered as much as possible so that all shelves are within safe reach without the use of a step stool. Except over the stove, the sink, and the microwave, a 15" to 18" clearance between the counter and the bottom of the cabinet is desired. Using a 2-shelf, 24" tall cabinet puts the top shelf within safe reach, about 5'6" above the floor. The use of full height storage cabinets is also suggested. The highest shelf which is not located over a counter should be no more than 6'0". Knobs, instead of edge pulls are easier for arthritic hands to use. A counter section with kneespace below will allow the elderly to sit while preparing food, reducing strain and fatigue.
2. **STOVES** - Provide stoves with dials and controls on the front edge instead of the rear panel (note that the rear panel is preferred in homes with small children, a difference in markets). Weak eyes may not be able to read rear dials without leaning over the stove, loose sleeves may also come in contact with the burners or pots. Seventy percent of all people who die from clothing fires are over 65. Where economics permit the oven should be wall mounted next to a counter; this eliminates the need for stooping and awkward lifting.
3. **HOT WATER** - The touch of an older person is slow to respond to water that is too hot. Water heaters should be set at 120°F. or "low".
4. **ELECTRIC OUTLETS** - To prevent shocks, ground fault circuit interrupters (GFCI) should be used for all kitchen convenience outlets within 6 feet of the sink (Section 210-8, *Indiana Electrical Code*; Section 4402, *Dwelling Code*).
5. **LIGHTING** - A higher than standard lighting level, about 40 to 50 fc, should be designed to compensate for weak eyes. Undercabinet lights will reduce shadows while providing good task lighting. Fluorescent lights are suggested for the ceiling for long life, which reduces the frequency of climbing a stepladder to change bulbs.
6. **FLOORS** - See #4B above.

#### 4D. **BATH ROOMS**

Like the kitchen, the bathroom is a potentially dangerous room.

1. **TUBS AND SHOWERS** - Some elderly can use a tub; some can use a shower; others cannot use either safely and must sponge bathe. In housing units with 2 bathrooms, provide one with a tub, the other with a

shower stall. The bottom of each should have permanent slip resistant surfacing. Provide grab bars at the entry position, on the sidewall, and straddling the edge of the tub. Wall grab bars should be screwed to studs or blocking.

2. **HOT WATER** - The water heater should be installed and set at 120°F. or “low”. The shower valves should have temperature limits or pressure balance to prevent scalding and should be readily reached from outside the tub or shower.
3. **TOILET** - The toilet should be positioned next to a sidewall to allow the installation of an assist grab bar. Provide a toilet with a seat height of about 18” (the standard is 16”). Avoid the available high seat toilets that are 20”; the feet of a short person may not reach the floor.
4. **FLOORS** - See item #4B above.
5. **ELECTRIC OUTLETS** - GFCI outlets are mandatory in bathrooms (Section 210-8, *Indiana Electrical Code*; Section 4402, *Dwelling Code*).
6. **LIGHTING** - Provide wall lights instead of ceiling lights for safer access to change bulbs.
7. **MEDICINE CABINETS** - A side wall mounted cabinet is easier and safer to reach than one mounted over a sink.

#### **4E. GENERAL ITEMS**

1. **LIGHT FIXTURES** - Provide adequately located light fixtures, in combination with switch-operated wall outlets (Section 4403, *Dwelling Code*), to light all areas including closets. A light switch or lamp should be close to beds. Wall fixtures are preferred over ceiling fixtures for easier and safer bulb changing. Provide night lights in hallways and bathrooms. Outside lights between living quarters and parking, and at entrances, patios, balconies, curbs and steps, should be over 5fc and shielded to reduce glare.
2. **PATIOS** - The steps and railings used at patios, decks and balconies should be detailed for safety. The surface should be slip resistant, especially when wet. The steps should have a handrail, even if there are only a few steps.
3. **TELEPHONES** - Wall jacks should be located in all rooms for telephones, but most importantly next to beds in bedrooms so that a sleepy or ill person won’t need to arise to answer or place a call. The elderly are more apt to be dizzy or unsteady upon rising.
4. **CORRIDORS** - Handrails should be provided along both sides of apartment building corridors.
5. **GLASS** - Patio doors, glazed doors, shower doors, and glazed panels adjacent to these and other hazardous locations, must be installed with safety glazing (Section 2406, *Indiana Building Code*; Section 308, *Indiana One & Two Family Dwelling Code*).

#### **4F. FIRE SAFETY**

The elderly are a high-risk group in an emergency situation. While the primary objective of safe design is to reduce the incidence of accident and fire, the companion effort is to provide refuge and safe egress. The older resident will be more quickly overcome by smoke, slower to arouse, more easily disoriented, and subject to falling during a panic escape.

1. **SMOKE DETECTORS** - Detectors are required in all living units and recommended in apartment corridors. While battery units are permitted in existing single family homes, house wired units are required in new construction. The placement of the detectors should not be compromised in any way (Section 310.9.1, *Indiana Building Code*; Section 316, *Indiana One & Two Family Dwelling Code*).
2. **SMOKE SUBDIVISION** - Large apartment buildings for the elderly should have each floor subdivided into compartments by smoke partitions and corridor rated smoke doors, which close with the activation of any alarm. This will allow occupants quicker access to an area of refuge. If each apartment does not have a balcony, a single common balcony located off the corridor will provide all residents and escape from smoke and a rescue location.
3. **FLAMMABILITY** - Indiana building codes have flame spread requirements for the walls and ceilings of apartment buildings, but do not have requirements for furnishings, contents, and window treatment. Furnishings provided by management should be selected for low flame spread, smoke and toxic fume generation.
4. **EMERGENCY SYSTEMS** - In apartment buildings, exit lights, emergency exitway lighting, audible and visual fire alarm signals, fire extinguishers, sprinklers and fire hose standpipes must be provided per code requirements (Chapter 9, *Indiana Building Code*). Post an emergency escape plan in every apartment dwelling unit.
5. **EMERGENCY CALL SYSTEM** – Apartment units should be provided with a distress call system, which signals a central office and has a corridor signal light. Call locations (pull cord, pushbutton, or intercom) should be located in the bathroom and bedroom.
6. **SPACE HEATERS** – Kerosene space heaters, wood stoves, or fireplace inserts are so dangerous that they have no place in a residence for the elderly, even though such units may be permitted by code in certain occupancies. Use of space heaters is regulated by the *Indiana Fire Prevention Code*, *Indiana Building Code*, *Indiana Mechanical code*, *Indiana One & Two Family Dwelling Code*, and certain referenced standards.
7. **SPRINKLER SYSTEMS** – Automatic fire suppression systems (water sprinkler systems) are not common, nor required in residences. However, the installation of these would reduce personal injury and property loss, as well as reducing insurance rates. *NFPA 13R* establishes standards for residential sprinkler systems.

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